A "Schrödinger's Muslim?!"

Just from the title of today's discussion, you may have had an inkling that we are going to be taking on, from an Islamic perspective of course, the topic of Quantum Mechanics (QM).

You are correct.

You may also be asking: what happened to Schrödinger's cat?

Well, after our discussion today, you will see (figuratively) how curiosity killed Schrödinger's cat, and put the spotlight on something *more* interesting: a "Schrödinger's Muslim!"

To start off, we first need to ask: just what is QM[1]?

Well, per our modus operandi, we will skip over the technical nitty-gritty details, and say that, for our purposes, it will be enough to think of it as two styrofoam spheres floating together in some water.

These two spheres, although they are both distinct, individual objects, once they get close enough to each other, they will start to behave in the exact same way and also synchronize with each other, but: one will rotate upwards, the other will rotate downwards; one will twirl to the left, the other will twirl to the right, etc., or both will each do all of those possible movements.[2]

What becomes weird about their relationship is that, once they synchronize like this, you can pull them apart from each other as far as you want, and even stick them at opposite ends of, for example, the physical width of our known universe, and it will *not at all* affect their synchronized motion.

Of course, our example is about two styrofoam spheres, but in real life scientists work with particles called photons, electrons, etc. Photons, electrons, etc., FYI (if needed), come from atoms, and atoms make up molecules, which make up the physical objects you see around you, as well as you yourself, too.

And the baffling part about this is, once you stick the two spheres at the opposite ends of the universe, or, if possible, even further away than that, you can do a cool trick: teleportation.

Yes! Teleportation, as in making something disappear from where it currently is, and then making it reappear somewhere else far away, just like in science fiction tv shows like Star Trek. (If you don't know what teleportation or Star Trek is, then this would be a good time to look these up on the internet before continuing onward).

Scientists have been working on Quantum Teleportation for a while now, and they have been successful in getting results.[3] However, they can currently teleport just photons, and there is not going to be any chance of teleporting human beings any time soon; things just get way too complicated.

The way that photon teleportation works is that, eg. in terms of the two styrofoam spheres we started with, first you bring in one more sphere, let's call it sphere C, for a total of three spheres, and then you bring it close to one of the other two original ones, sphere A for example. If you paint sphere C blue, once you bring it close enough to sphere A, what happens is that the sphere that is left alone and at the very far end of the universe, sphere B, suddenly turns blue, while both spheres A and C disappear into oblivion, and no longer exist. And, when this happens, the explanation for it is: (the information that was) sphere C teleported over to the exact spot where sphere B was (physically) located.

Believe it or not, scientists have done this experiment over and over many times now, and THIS IS EXACTLY WHAT HAPPENS EACH TIME!! (NB: the colour of sphere C in our example is only for illustrative purposes, things work a bit differently in real life; also the "spheres" the scientists use are called photons).

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[1] https://m.youtube.com/watch?v=JP9KP-fwFhk

[2] **quantum entanglement** means the two entangled particles have an opposite behaviour to each other when one is observed; **superposition** means they each have the same multiple behaviour(s) before that observation

[3] https://m.youtube.com/watch?v=LdNKCEvWnGg

So the explanation they give for the teleportation is that spheres A and B are in what is called a state of "quantum entanglement." Sounds fancy, and, although the science and math behind it is fancy too, the bottom line is that:

-it is possible to synchronize two spheres/photons/etc., eg. A and B
-then to separate them over an INFINITE distance
-then to introduce a third sphere/photon/etc., eg. C
-then to sync C with either A or B
-then to teleport C over to wherever either A or B had been, depending on your previous choice

So what does all this have to do with Schrödinger's cat (or even a "Schrödinger's Muslim")?

Let's talk about the cat first.

Schrödinger was a scientist, and the cat in the box thought experiment he designed was his way of explaining the crux of the ideas in QM. He thought of a box with a cat inside it, along with [a potted plant][4].

The idea is that there will be a point, eventually, where [the plant will go through its cellular respiration cycle, ["making things difficult"] for the poor kitty cat]. But, there is also a chance that [photosynthesis will continue], and the cat will be spared. So, once you put the lid on that box, he says that, technically, you can't know for sure what is happening to the cat inside that box. He says, with the lid closed, technically, there is a *simultaneously* equal chance that it is both alive, *and* that it has died.

Disclaimer: please do not attempt to do this experiment. Schrödinger himself did not do it, and only proposed it as what is called a *thought experiment.* He also lived at a time where people's sensitivities were really dull, and dumb.

That being said, Schrödinger was trying to make the point that: in QM, you have to consider that (BOTH) ALTERNATE REALITIES ARE POSSIBLE.

Take a minute to let that sink in, because his main point is a doozie! And, at the same time, as macabre as it is, it somehow makes sense.

So, to clarify, Schrödinger's problem has to do with, getting back to our styrofoam spheres A and B, what is actually happening when we say the two spheres have become *synchronized* together.

For the scientists carrying out their experiments with photons, the challenge is that the photons that they synchronize, photons A and B, each one, on it's own, is "twirling and swirling" in it's own way, as compared to the other. But, once they are brought close together to each other, both of them:

-continue to twirl and swirl they way the were doing before, while on their own

and after synchronizing

-*also* twirl and swirl like the other photon

NB: *both* the photons do both actions AT THE SAME TIME, AND ON THEIR OWN

That is the connection between Schrödinger's cat and Quantum Mechanics: they both say that different and opposite possibilities HAPPEN AT THE SAME TIME.

So, for the cat, how do you really find out for sure and get a definite answer about what's happening to it?

Simple: open the box.

That way, you will either see that the cat is still alive, or that it is dead.

The point is, *before you look*, you will have *no way of knowing*, and that means that BOTH POSSIBILITIES ARE SIMULTANEOUSLY TRUE.

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[4] this is the milder version of Schrödinger's thought experiment introduced to us high school science class

So, for the scientists working with the photons, their experiments confirmed these ideas.

Of course, a photon is not anything like a cat, so it doesn't die or stay alive.

For photons, it is in the *direction that they spin in* which is the key.

Photon A can spin, eg, in a "clockwise" direction, and photon B can spin in the "counterclockwise" direction. But, once they synchronize/become entangled, and are separated, BOTH WILL SPIN IN BOTH DIFFERENT DIRECTIONS AT THE SAME TIME, each on its own.

So, how do you know what is really happening, eg. with photon A or B: is it spinning clockwise or counterclockwise?

Well, to find out for sure, you would have to "open the box" and look inside.

The way scientists "open the box" on a photon is this:

-they shine a laser beam onto a backdrop
-they put in a barrier with two slits cut into it between the laser and the backdrop
-they put a photon detector between the barrier and the backdrop
-they turn on the laser

What they see when they do this is a pattern with many line segments form on the backdrop due to the light from the laser. But, when they then turn on the photon detector, that pattern changes to just two line segments. Then, if they turn off the photon detector, the many line segment pattern comes back. And this happens every time, without fail, no matter how many times they repeat the experiment.

A key point to note here is, when you look at one photon/sphere/etc., eg. A, it is guaranteed that, without having to look at it, B will be doing whatever is the opposite: ie. if A is twirling left, B is twirling right. This is because the synchronized photons can only behave in one way when you look at them.

So, what does this show?

Well, it shows that, when the photon detector is on, and "the box is open," each of the photons behave only in *one* of two possible ways, but when the detector is off, they all behave IN MULTIPLE ALTERNATE WAYS, EACH AT THE SAME TIME, AND ON ITS OWN.

That's the point which the Schrödinger's cat example tries get across: ALTERNATE REALITIES HAPPEN, EACH AT THE SAME TIME, AND ON ITS OWN.

Of the consequences this revelation has had, ie. because experimental results have confirmed it, is that some people have started to now believe in the possibility of *multiple* parallel realities and *multiple* parallel worlds, each one existing on its own, and alongside the one which you and I are now experiencing.

Isn't that exciting and unsettling at the same time? ie. the thought that multiple alternate worlds, realities, and outcomes of all kinds, scientifically speaking, are possible?

It sure is!

So, ever wonder if Islam and its teachings can cope with such ideas?

Since we have managed to get this far into our discussion, I'm sure the answer is a simultaneously definite and resounding: Yes!

Well, then let us say Bismillah, if there was ever a better time to do so, and now talk about a "Schrödinger's Muslim": a being who, although he has a firm belief in God's existence, he is, at the same time, induced into a perplexed and overwhelmed existential state of near-Atheism brought on by scientific progress.

Since the complexity that Schrödinger brings to light, as confirmed by the scientific laser/photon experiments, is that multiple realities do happen at the same time, and that it is only when "the box is opened" that we can have certainty of things behaving in just one particular way over another, then we can ask: how is it that we, all men, world-wide, share in just the one reality of the universe, especially in light of Schrödinger's idea that simultaneous multiple alternate realities exist, with scientific results backing it up?

Shouldn't there be just as many multiple realities happening right now as there are individual humans living on this planet?

Or, more accurately, shouldn't there be just as many multiple realities happening right now as there are individual particles to be found in the universe?

Then why isn't it like that?

Why is there no chaos in the universe, in contrast to what scientific experimentation has shown?

What has "opened the box" on human beings because of which we all share a common experience of reality?

Well, as Muslims looking for answers, we, of course, turn to our favourite book, the Holy Quran, along with the Ahadith of our Infallible Aema ع.

And that is where we find the following tidbits:

> (Ch 2:225) "Allah, there is no God but He, the Ever-Living, the Sustainer of all things whom neither slumber nor sleep overtake. To Him belong whatsoever is in the heavens and whatsoever is on the earth. Who is it that can intercede with Him except by His permission? He knows what is [presently] before them and what will be after them, and they encompass not a thing of His knowledge except for what He wills. His throne [control; might] extends over the heavens and the earth, and of their preservation He tires not. And He is the Most High, the Most Great...."
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> (Ch 6:59) And with Him are the keys of the unseen; none knows them except Him. And He knows what is on the land and in the sea. Not a leaf falls to the ground without His knowledge of it. And not a grain seeds itself within the dark regions of the ground, either moist or dry, without there being an exact tally of it [by Him].
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> (Ch 67:13) Whether you say a thing secretly or openly, He knows the innermost secrets of your hearts
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> (22:75) ....Indeed Allah is All Hearing, All Seeing.
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> (Ch 17:17) We have created seven ways above you; of Our creation, We are never inattentive.

These verses help to dispel the point that multiple alternate realities happen at the same time, *especially* with regards to the experience of life and existence of mankind.

The reason for this is because these verses, and many others not mentioned here for brevity, illustrate that all matter is being seen/looked at directly by Allah س; that Allah س is fully aware and seeing, hearing, and looking at all of His creations, all at the same time, ie. that everything is in His Ever-Presence at any given moment.

This is a big deal because Schrödinger's point is that, as long as the lid stays on the box (with the cat inside it), alternate possibilities, ie. one saying that the cat is dead and the other saying that the cat is alive, are true. But, once you open the lid and look inside the box, you will only see one definitive truth.

This is the same type of result that scientists get in their experiment with the photons from the laser: when the photon detector is off, the laser beam pattern forms multiple lines on the backdrop indicating that those photons are in multiple alternate phases all at the same time, and then, once the detector is turned on, the laser beam pattern forms just two lines on the backdrop, indicating the "lid on the box" has been opened, and that only one definitive phase is observable for those photons.

So, if we combine scientific facts with what the Holy Quran is saying, the conclusion we can draw is: because Allah س is looking at us, there is no "lid on the box" for us any more, and thus the reality we are experiencing is one that is stable and non-chaotic in essence.

Because Allah س's perspective is all that matters, it is what gives us the context in which we find ourselves.

Therefore, reality is no way chaotic, per what the existence of simultaneous multiple alternate realities idea would lead our imaginations to believe.

This means, if there is phenomenon that exhibit behaviour displaying multiple alternative realities, then, because that behaviour does not disrupt our lives in a detrimental manner, that Allah س has allowed for it to happen, and is not Himself puzzled by it, nor is it out of His scope and power to control such "spooky action."[5]

In Tawhid alMufaddhal, our 6th Imam, Jafar Al-Sadiq ع says:

> They became disbelievers, and because of a deficiency of their knowledge and lack of intellect, began quibbling inimically with Truth, so much so that they denied creativeness and claimed that all this universe was meaningless and vain, without any ingenious design on the part of a Designer or Creator - a purposeless non-entity without balance or poise.....
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> ....This analogy holds good in the case of the sect who deny the creative factor and the argument in favour of Divine Design. Failing to appreciate the merit of their provision, the perfection of creation and the beauty of design, they start wandering in the wide world, bewildered by their inability to grasp with their brains the underlying causes and principles.
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> It so happens sometimes that someone among them is aware of a thing but in his ignorance of its reality, purpose and need, begins at once to find fault with it saying, "it is untenably wrong." (p. 7-8, www.wilayatmission.com)

The takeaway from all this is that, if, as "Schrödinger's Muslim(s),"we're going to open the box on ourselves, and then ponder over the state of ambivalence that our non-Muslim/Atheist brethren would seem to want to impose upon us, we will find that, because of the insights provided to us by the Holy Quran and our Aema ع, in terms of our religious obligations, we actually have had our work cut out for us.

This is because, after learning that we are in Allah س's Ever-Presence, and also that He sees us and hears us-including our innermost thoughts-all on top of what science (inadvertently) tells us about the definitive truth being contingent on (Allah س being) the observer, then we know one thing with even greater certainty: that we must be more diligent in our relationship with Allah س.

Allah س says in the Holy Quran (Ch 92:4-17):

> Assuredly your efforts, your deeds, are dissimilar, with some working towards Paradise by means of obedience, while others [in effect] are working towards the Fire through [acts of] disobedience. Then, as for him who gives (out of his wealth for God's good pleasure), and keeps from disobedience to Him in reverence for Him and piety, and believes in the truth of what is right, We shall surely ease his way to [the abode of] ease, to Paradise. But as for him who is stingy, with what is due to God, and deems himself self-sufficient, without need for His reward, and denies the truth of what is right, We will make easy for him the path to hardship (punishment after a hard reckoning). And, his riches will not avail him when he falls headlong (into the Abyss). Our part is to provide guidance, and to Us belong the Next Life and the present. Therefore, I warn you of a Fire blazing fiercely (Hell) in which none except the most wicked will burn: they who rejected the Truth, calling it falsehood and turned their backs on it, and from which the most god-fearing shall be spared.

Praying that, out of His love for the Holy Prophet ص and his Holy Household ع, may He س count all of us amongst the God-fearing ones,

Your Brother in Faith,

SMH Razvi

Note: Seeing as how our 6th Imam ع has made reference to what is now considered "the Argument from Design," and regarded now as a fall-back point to which non-Atheists turn to prove God exists, it helps to note that, in Ch. 67 of the Holy Quran[6], Allah س Himself challenges (all) mankind to see if there is: "...any irregularity, disparity or discordance..." in the way any of the "...seven heavens..." that he has created behave.

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[5] When he learned about QE, this is how Albert Einstein, the E=mc2 guy, referred to it

[6] 23 Tafsir jalalayn: https://qurano.com/en/67-al-mulk/verse-3/